सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (58वीं)/2022/ 10092-10139 दिनाँक: 26 October 2022

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 58वीं बैठक का कार्यवृत ।
Subject: 58th meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 58वीं बैठक दिनांक **30 सितंबर 2022** को **1100** बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 58th meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **30 September 2022** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

Naresh 26/10/22

(नरेश भंडारी)
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

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उत्तरी क्षेत्रीय विद्युत समिति की 58वीं बैठक

58th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11:00 HRS; 30 September, 2022

Venue: Video Conferencing

Minutes of the Meeting

Shri Naresh Bhandari, Member Secretary, NRPC welcomed the participants. He informed that Sh. Shurbir Singh, CMD, DTL has taken over charge of Chairperson, NRPC on 27 September 2022.

Shri Mukesh Sharma, Dir (Op), DTL informed that Chairperson, NRPC has not been able to attend this meeting. He welcomed the participants. He raised the issue faced by DTL in tendering. He stated that DTL is compelled to drop tenders as bidders are quoting as high as 40% above rates. He requested that POWERGRID as well as other utilities may express their experience in this regard.

MS, NRPC suggested that tender issues faced by DTL may be due to Make in India restriction, and COVID effects. DTL may constitute a committee for market survey. Utilities may also share their bid document with DTL. DTL may also explore discussion in open forum of bidders.

Further, He added that October month is crucial with respect to winter preparedness. High voltage issues are also observed since October. He emphasized that renewal generation is coming in higher quantum alongwith their issues of integration with grid. A Committee has been constituted by Chairperson, CEA with the following members for taking up RE related issues:

i. Member (GO&D), CEA *(chairperson of the committee)*
ii. CMD, POSOCO, or, his representative at an appropriate level;
iii. COO, CTU, or, his representative at an appropriate level;
iv. Director (Power System), SECI;
v. Chief Engineer (PSPA-I), CEA;
vi. Member Secretary, NRPC;
vii. CGM I/c NRLDC; and,
viii. Chief Engineer (GM) as *Member Convener*

A.1 Approval of MoM of 57th NRPC meeting

A.1.1 Forum was apprised that minutes of 57th NRPC meeting has been issued on 27 September 2022. No comment has been received till the date.

A.1.2 Punjab requested that point no. A. 9.15 may be deleted from MoM as there is no requirement for discussion in CMETS-NR as the agenda has been discussed in OCC already. Point no A. 9.15 is reproduced as below:

"CTU stated that PSTCL may also submit their consolidated proposal for ISTS works

so that it can be taken up in ensuing CMETS-NR meeting for approval."

A.1.3 CTU stated that as per planning criteria, discussion is required in 'Consultation Meeting for Evolving Transmission Schemes in Northern Region (CMETS- NR)'. CTU also suggested PSTCL that schemes may be proposed in advance so that completion time of scheme may be achieved.

A.1.4 POWERGRID stated that discussion in CMETS is advisable as reactor may be re-configured due to change of line length.

A.1.5 PSTCL accepted that the agenda may be discussed in CMETS.

A.1.6 Further, it was decided that after discussion in CMETS, it may not be required to be discussed again in NRPC.

A.1.7 Therefore, forum approved the minutes as issued.

A.2 ULDC Phase-III SCADA/EMS System (agenda by POWERGRID)

A.2.1 Forum was apprised that POWERGRID vide mail dtd. 27 September 2022 has requested for discussion on following points:

(i) Information to all constituents of implementation of NR ULDC-III SCADA/EMS system by POWERGRID.

(ii) Modalities for 7year AMC of the SCADA/EMS system.

(iii) Implementation of Cyber Security measures in SCADA/EMS – Centralized Patch management/Security controls.

(iv) Backup Control centers- Operations and Readiness philosophy.

(v) Upgradation of SCADA project is likely to be commissioned from January, 2025 to June, 2025 in phased manner. Accordingly, RLDCs/State utilities may extend their ongoing AMC contract for a period of two years as per provisions of AMC contracts.

A.2.2 MS, NRPC stated the agenda may be discussed only when officials (of utilities) dealing with SCADA is connected in the meeting.

A.2.3 Most States confirmed that concerned SCADA team is present in the meeting.

A.2.4 Following was discussed:-

a. Implementation of NR ULDC-III SCADA/EMS system by POWERGRID:

i. ED, POWERGRID apprised the forum that ULDC-III SCADA/EMS shall be implemented by POWERGRID across the country. As per agreement between POWERGRID and POSOCO, NR & ER would

be covered by POWERGRID and WR & SR would be taken care by POSOCO. Himachal Pradesh who earlier had shown willingness with POSOCO stated that they are using World Bank funding for ULDC-III and therefore POWERGRID is to accommodate them accordingly. POWERGRID assured that they would consider this aspect.

b. 7 year AMC of the SCADA/EMS system:
   i. POWERGRID apprised that AMC shall be executed by States as per practice in ULDC-II.
   ii. States requested that AMC shall be done by POWERGRID only. They highlighted that vendors don't listen to them. Punjab and Uttar Pradesh requested that handholding is required.
   iii. MS, NRPC stated that POWERGRID may provide handholding.
   iv. POWERGRID proposed that 20-30% value of tender may be considered for AMC.
   v. Forum decided that the matter may be discussed in special TCC.

c. Cyber Security measures in SCADA/EMS
   i. POWERGRID stated that patch may be sent to POSOCO. Thereafter, centralized patch management may be done by POSOCO and localized patch management may be done by SLDCs.
   ii. POSOCO stated that SLDCs may be made responsible for patch management.
   iii. Forum decided that centralized patch management would be a better option.

d. Backup Control Centers
   i. POWERGRID stated that back up is proposed to be established in the same state. PSCTL has desired its back up at BBMB.
   ii. MS, NRPC stated that setting up back-up in the same state may not be suitable decision considering disasters like cyclone, earthquake, terror attack etc. Rather, back-up shall be set up in compliance of disaster management guidelines in different seismic zone. He quoted example of NRLDC whose back up has been set up in ERLDC.
   iii. POWERGRID stated that incidences of fire, terror attack have been considered already. MS, NRPC stated that a confirmation from NDMA may be sought in this regard.
   iv. Forum decided that the matter may be discussed in special TCC.

e. Upgradation of SCADA

i. POWERGRID apprised that upgradation of SCADA project is likely to be commissioned from January, 2025 to June, 2025 in phased manner. Accordingly, RLDCs/State utilities may extend their ongoing AMC contract for a period of two years as per provisions of AMC contracts.

ii. RVPN stated that AMC is done by POWERGRID only.

iii. POWERGRID stated that they may explore the contract document and accordingly AMC may be done by POWERGRID or State as mentioned in contract document.

A.2.5 Himachal Pradesh raised issue that insurance has been expired last year and is due for renewal. The same has been requested to POWERGRID.

A.2.6 POWERGRID stated payment of insurance cost is pending from states. However, the matter shall be taken up at appropriate level by POWERGRID.

A.2.7 Some states also raised issue that SIEMENS does not listen to them. POWERGRID assured to take up the matter.

A.3 Provision of Phasor measurement units (PMUs) at POI in RE feeders in Rajasthan (agenda by POWERGRID)

A.3.1 CGM, POWERGRID apprised that in the wake of recent grid disturbances in Northern region (RE complex in Rajasthan), a meeting of various stakeholders was convened by POSOCO on 21 September 2022 to discuss the relevant issues. The issue of lack of oscillography data at Inverter terminals and POI was discussed during the meeting. In this context, POSOCO requested POWERGRID to make provision for phasor measurement units (PMUs) at Point of interconnection (POI) i.e. POWERGRID bus and integrate the same in NRLDC system for capturing data during such events.

A.3.2 A list of RE feeders (including upcoming RE generators) terminating at various pooling stations of POWERGRID in Rajasthan is as below (List attached as Annexure-I of agenda):

S. N.	POWERGRID pooling substation	No. of RE feeders (nos.)
1	765/400/220kV Fatehgarh-2 substation	23
2	765/400/220kV Bhadla substation	14
3	765/400/220kV Bhadla-II substation	18

4	765/400/220kV Bikaner substation	8
		63

A.3.3 On the request of POSOCO, it is proposed to install PMUs in above mentioned 63 nos. feeders connected to RE generators for improved dynamic snapshot of the system during grid events/disturbances. The total estimated cost of installation of PMUs in 63 nos. feeders is Rs. ~14.0 Cr.

A.3.4 MS, NRPC enquired that as PMU is available at generator end located generally at 10-20 km distance of POI sub-station, whether data from same PMU can be used for analysis at sub-station end.

A.3.5 CGM, NRLDC stated that PMU at point of inter-connection is required for examining regulatory compliance of RE generators. There may be slight difference due to distance between generator ends and sub-station. However, possibility of accommodating 2 feeders in 1 PMU may be explored. Future projects may also be kept in mind while finalizing PMU numbers and locations.

A.3.6 POWERGRID stated that 1 PMU may accommodate 2 feeders only when both are in same kiosk. He also highlighted that PMU at both ends are required considering dynamics of power flow.

A.3.7 CGM, NRLDC stated that a sub-committee has been constituted under Member Secretary, WRPC. Its report may also be referred.

A.3.8 MS, NRPC stated that report from WRPC sub-committee may be asked and thereafter matter may be discussed in upcoming NRPC meeting.

A.4 UPPCL request for review of SRPC methodology in view of issue of calculation of transmission charges for UPPCL share in UCH Stage-II (132 MW), UCH Stage-III (66 MW) (Agenda by NRPC Sectt.)

A.4.1 Forum was apprised that the issue was discussed in 57th NRPC meeting wherein it was decided that the issue may be discussed separately at NRPC Secretariat.

A.4.2 A separate meeting was held on 23 September 2022 at NRPC Sectt., New Delhi, wherein, the issue was discussed (MoM attached as Annexure-II of agenda) and it was concluded that:

(i) As per SRPC methodology, UP's request for exemption in transmission charges in case of UCH-II, & UCH-III is not tenable as STU network is not sufficient to evacuate its share.

(ii) As per UP's request, SRPC methodology may be scrutinized at NRPC forum level.

A.4.3 Therefore, decision on request of UP for review of SRPC methodology may be taken.

A.4.4 SRPC methodology finalized by LTA Sub Group comprising the Members from CTUIL, NLDC, SRLDC and SLDCs/STUs of Southern Region and approved in 39th meetings of TCC (03.12.2021) & SRPC (06.12.2021) is attached as Annexure-III of agenda.

A.4.5 CTU stated that 3rd transmission line (ISTS) was planned as available network was not sufficient for catering load of Raebareily.

A.4.6 MS, NRPC stated that issue of LTA/ MTOA quantum for generating stations connected to both ISTS and intra-State transmission system was discussed as an agenda (by SRPC) in CERC meeting with RPCs held on 17.11.2021, wherein, Hon'ble CERC decided that a group may be formed under chairmanship of Member (ISJ), CERC to solve the issue. However, it has been mentioned in the CERC MoM dtd. 04 January 2022 that genesis of the transmission line at time of planning is to be seen and not the power flow in such transmission lines, which is a dynamic thing.

A.4.7 He emphasized that Unchahar is an old generating station. It was initially a state (UP) generating station (2x220 MW) along with associated transmission system. Later, it came into being as ISGS. Considering, the genesis, UCH-II may be exempted from ISTS charges. However, ISTS charges may be applicable for UCH-III.

A.4.8 CGM, NRLDC stated that settled cases may not be opened.

A.4.9 Forum agreed unanimously.

A.4.10 UP accepted the decision of forum.

A.5 Change of line name for NROSS (AGC) scheme, approved in 48th NRPC: OPGW installation on 220kV Anta (NTPC) - RAPP 'C' line (87.5km) in lieu of Anta (RVPNL)-Kota line (91.5km) (agenda by CTU)

A.5.1 CTU apprised that OPGW installation on 400kV Anta-Kota line (91.5km approx.) was approved as part of NROSS scheme in 48th NRPC for redundant communication connectivity for AGC at Anta (NTPC) generating station. It was observed during survey that Anta-Kota line is originating from Anta (RVPNL) and

not from Anta (NTPC). OPGW requirement on said line will not cater the data connectivity for Anta (NTPC).

A.5.2 Matter was informed to 2nd ISTS Communication Planning Committee Meeting for NR held on 25 July 2022. POSOCO emphasized that for AGC implementation redundant OPGW connectivity is required at the earliest for Anta (NTPC).

A.5.3 Following ISTS lines are connecting Anta (NTPC) with Northern Region grid:

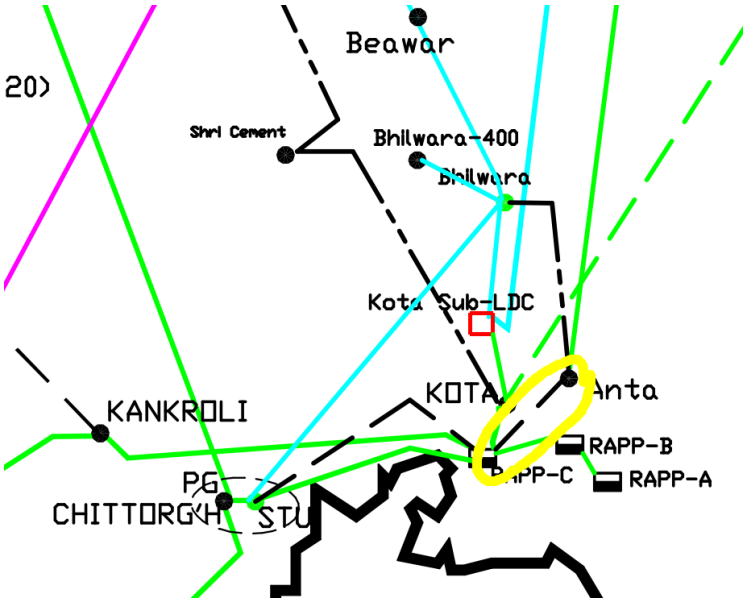
(i) Anta (NTPC) - RAPP 'C' (87.5km)

(ii) Anta (NTPC) - Bhilwara (187km)

(iii) Anta (NTPC) - Bassi (250km)

A.5.4 RAPP 'C' is nearest wideband node to Anta (NTPC). In view of same, it is proposed to approve actual link name as Anta (NTPC) - RAPP'C' (approx. 87.5km) for installation of OPGW as part of Northern Region OPGW Strengthening Scheme (NROSS) for AGC. Cost of OPGW installation on 220kV Anta (NTPC) - RAPP 'C' line is estimated around ₹ 4.38 Crore which is less compared to previous approval (₹ 5 Crore).

A.5.5 OPGW requirement on 220kV Anta (NTPC) - RAPP 'C' line (87.5km) of POWERGRID was deliberated in 20th NR-TeST meeting held on 09 September 2022 and recommended for NRPC approval.



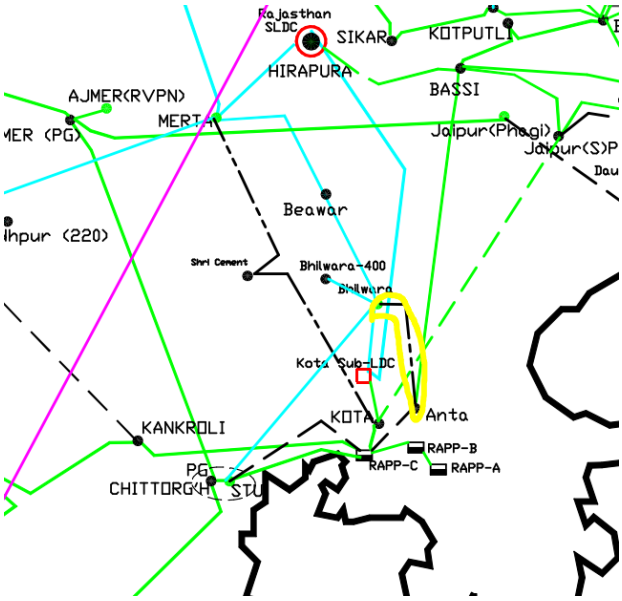
A.5.6 After deliberation, forum approved CTU proposal as above.

A.6 OPGW installation on 220kV Anta (NTPC) - Bhilwara Line (agenda by CTU)

A.6.1 CTU apprised that during 2nd ISTS Communication Planning Meeting for Northern Region held on 25 July 2022, issues regarding reliable communication for Anta (NTPC) was deliberated.

A.6.2 One 220kV line is existing between Anta (NTPC) & Bhilwara substation. As Bhilwara is an existing wideband node in NR, it is proposed to install OPGW on 220kV Anta (NTPC) - Bhilwara line i.e. 187km. This will provide a reliable communication data connectivity to Anta (NTPC). Cost of OPGW installation on Anta - Bhilwara line comes around ₹ 9.35 Crore.

A.6.3 OPGW requirement on 220kV Anta (NTPC) - Bhilwara line (187km) of POWERGRID was deliberated in 20th NR-TeST meeting and recommended for NRPC approval. Above OPGW requirement may be implemented under ongoing NROSS project for AGC.



A.6.4 CTU highlighted that Anta (NTPC)-Bassi line OPGW is old and requires replacement. Hence, Anta (NTPC)-Bhilwara is proposed here. It was also highlighted that Anta (NTPC)-Bassi is LILOed at 3 places.

A.6.5 POWERGRID stated that Anta (NTPC)-Bassi line OPGW has been booked under POWERTEL and hence cost burden is not on beneficiaries.

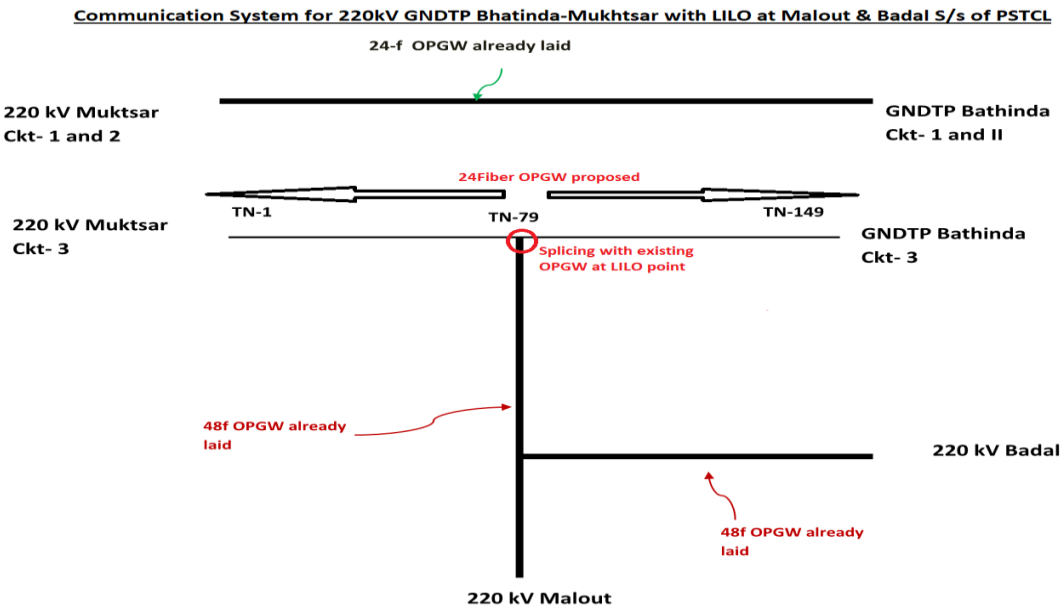
A.6.6 After deliberation, forum approved CTU proposal.

A.7 OPGW Installation on 220kV GNDTP Bhatinda - Mukhtsar (3rd circuit) to provide data & voice connectivity to LILO sub-stations at Badal & Malout (PSTCL) – (Agenda by CTU for PSTCL)

A.7.1 CTU apprised that there are 3 circuits of 220kV GNDTP Bhatinda-Mukhtsar line. Circuit-1 & circuit-2 are on 220kV double circuit towers and circuit-3 is on separate double circuit towers. Circuit-3 is LILOed at Malout S/s & Badal S/s. 48Fiber OPGW is installed on the LILO sections of circuit-3 at Malout S/s & Badal S/s. As circuit-3 of GNDTP Bhatinda-Mukhtsar line is not having OPGW, to provide data &

voice connectivity to LILO sub-stations i.e. Malout & Badal OPGW is required to install on the 3rd Circuit of 220kV GNDTP Bhatinda-Mukhtsar line.

A.7.2 Single Line diagram for GNDTP Bhatinda-Mukhtsar is enclosed for ready reference.



A.7.3 In the 20th NR-TeST meeting, PSTCL proposed for OPGW installation on circuit-3 of 220kV GNDTP Bathinda – Mukhtsar (length- 51km) & splicing with existing OPGW on LILO sections at Malout & Badal under any of the ongoing projects. Cost for above OPGW requirement is estimated around ₹ 3 Crore. PSTCL proposed that investment for OPGW installation on circuit-3 of GNDTP Bhatinda-Mukhtsar shall be shared by PSTCL with POWERGRID as per CERC notification and scheme shall become part of existing ULDC schemes. This proposal was deliberated and approved in 20th NR-TeST meeting held on 09 September 2022 and recommended for NRPC approval.

A.7.4 After deliberation, forum decided that since Bhatinda – Mukhtsar is not ISTS line, POWERGRID and PSTCL may discuss bilaterally on this. However, forum concurred technically.

A.8 Replacement of existing old OPGW (agenda by CTU)

A.8.1 CTU vide mail dtd. 27 September 2022 has submitted proposal as below:

(a) OPGW Replacement on 400kV Agra – Ballabhgarh (Length:181km)

(i) OPGW on 400kV Agra-Ballabhgarh line is an important ISTS communication link for northern region as well inter-regional data traffic coming from WR, SR, ER, NER to NR onwards to NLDC/NRLDC.

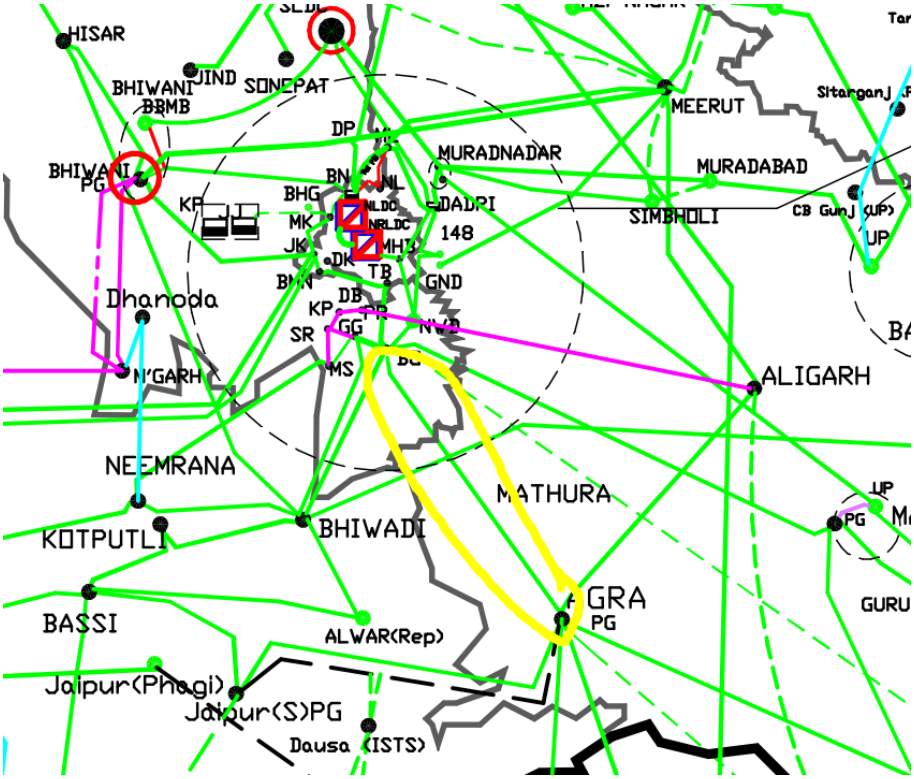
(ii) OPGW on Agra-Ballabhgarh was commissioned in 2004 & has completed its useful life of 15 years.

(iii) This line is crossing through industrial corridor in Agra-Mathura-Delhi NCR region. Higher deposition of pollutants/contaminants has caused rusting of OPGW, hardware fittings and vibration dampers.

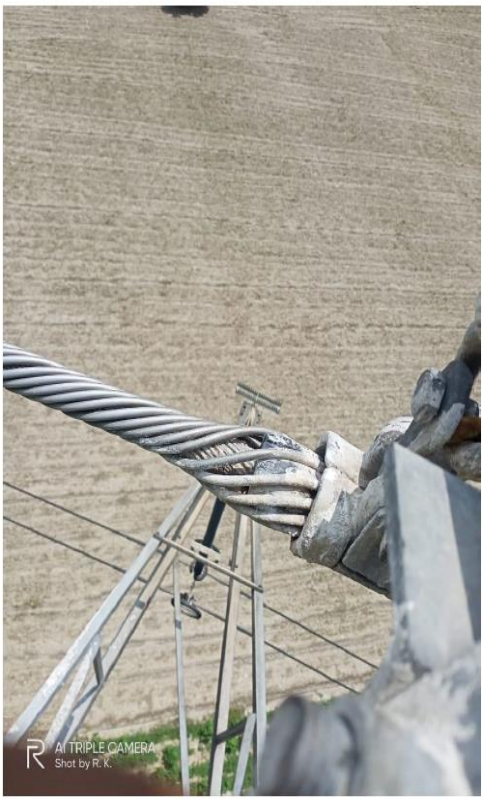
(iv) Corrosion of ACS strands of OPGW & hardware fittings has increased the OPGW downtime. Corrosion has also exposed the fiber optic tube to atmosphere and has reduced tensile strength of OPGW leading to frequent failures. Pictures from site are enclosed for ready reference.

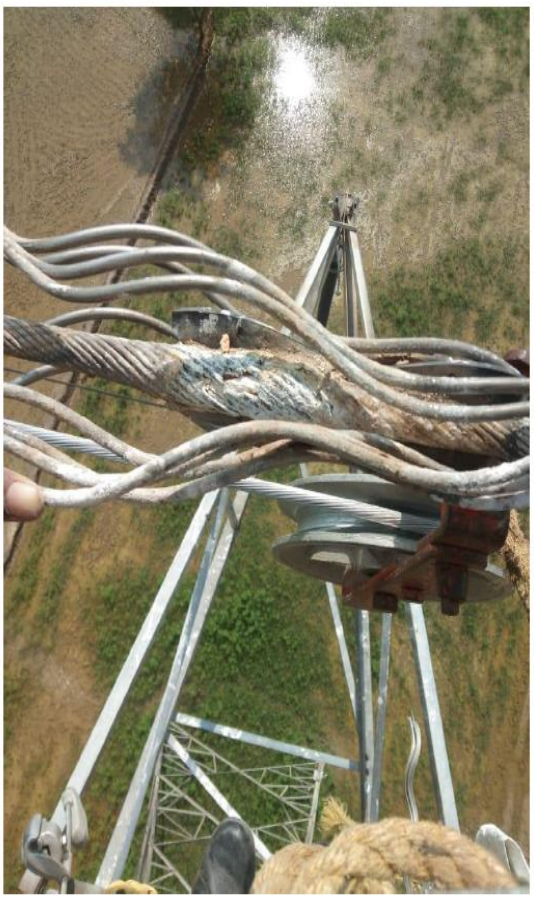
(v) To maintain availability of Agra-Ballabhgarh link. One signal amplifier has also been installed near Mathura section. Link quality is still deteriorating, and any further outage will impact grid management. Further, POWERGRID informed that in every rainy season, water ingress in the aluminum optical tube, resulting outage of OPGW links for longer period (15-20 days) and complete OPGW section needs replacement. They are facing this issue since 3-4 seasons and every time OPGW drum are being replaced for restoration of above critical OPGW link.

(vi) In view of above constraints, it is proposed to replace the old OPGW on 400kV Agra-Ballabhgarh line with new OPGW.

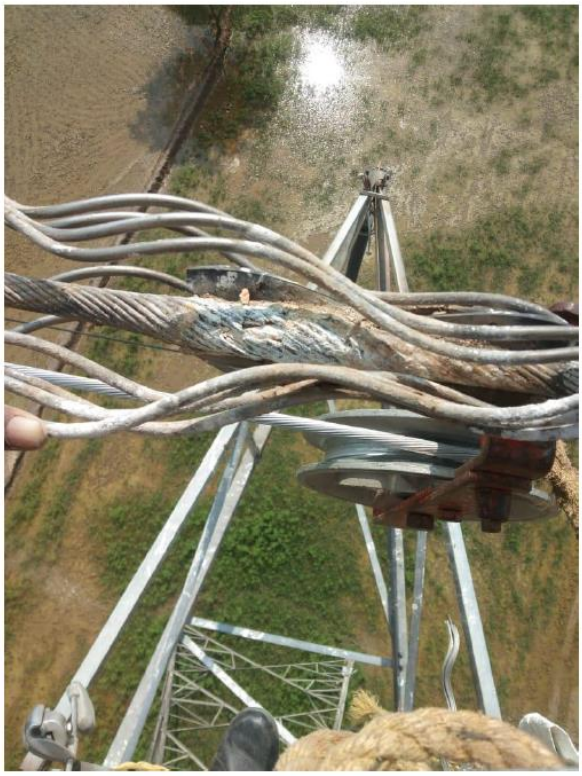


Fault on OPGW Cable in Agra- Ballabhgarh Link





Fault on OPGW Cable in Agra- Ballabhgarh Link



(b) OPGW Replacement on 400kV Kishenpur – Wagoora line (Length:183km)

(i) OPGW on 400kV Kishenpur- Wagoora Line (183km) was commissioned in 2005 & has completed its useful life of 15 years. Design system Attenuation of this link was ≤ 45.91dB whereas attenuation presently is around ≥ 80dB.

This line is further LILOed at New Wanpoh therefore link become Kishenpur-New Wanpoh-Wagoora. OPGW on LILO portion is installed in 2015 (around 3 kms.)

(ii) Kishenpur-New Wanpoh-Wagoora link provides backbone connectivity to important hydro stations and several sub-station of J&K to SLDC/NRLDC/NLDC such as Uri-1, Uri-2, Kishenganga HEP, Baglihar HEP, Amargarh, Wagoora Ramban, New Wanpoh, Alsuteng-Leh Transmission shall provide connectivity to upcoming SLDC at Ladakh with NRLDC/NLDC.

(iii) 400kV Kishenpur- New Wanpoh - Wagoora link also serves as backup link to 400kV Kishenpur-New Wanpoh CKT-3 & 4 link. In winters Kishenpur-New Wanpoh experiences heavy snowfall (up to 50mm ice) in some stretches.

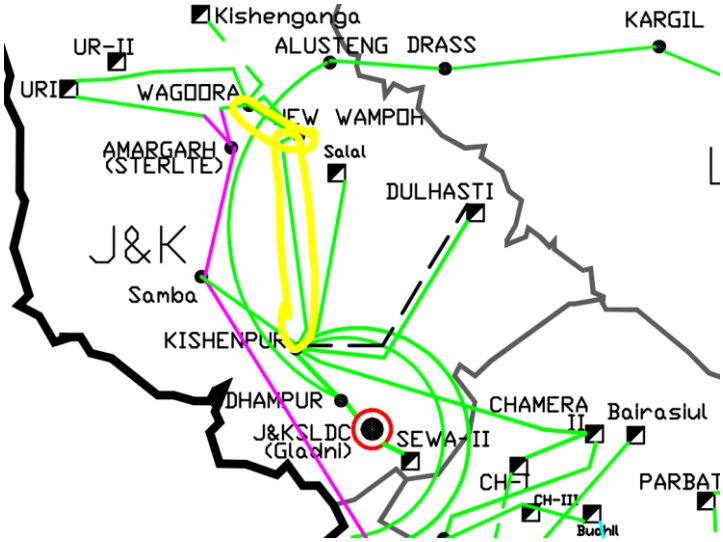
Rectification works in affected OPGW sections is very difficult as the site is unapproachable due to heavy snowfall in the valley.

(iv) In view of above constraints and critical nature of the link, it is proposed for replacement of old OPGW on 400kV Kishenpur-Wagoora line with new OPGW except LILO portion at New Wanpoh (3kms.)

A.8.2 Total Cost of OPGW replacement for above two lines mentioned at (a) & (b) (181+183=364km) is estimated to approximately ₹ 18.20 crores.

A.8.3 Replacement of old OPGW on 400kV Agra-Ballabhgarh (181km) & 400kV Kishenpur-New Wanpoh-Wagoora line (183km) of POWERGRID was deliberated and approved in 20th NR-TeST meeting and recommended for NRPC approval.

A.8.4 It is proposed to implement OPGW replacement work under any of the ongoing schemes in Northern region such as Reliable Communication Project or NROSS project or any upcoming project.



A.8.5 After deliberation, forum approved the proposal.

A.9 Redundant communication system for Bhinmal (POWERGRID) & Kankroli (POWERGRID) S/s: Sharing of 3 pair of fibers in existing RVPNL OPGW network, installation of OPGW on Jodhpur (Surpura) – Bhadla (5 kms) (upto LILO point in Jodhpur (Surpura) – Merta section) and additional STM-16 FOTE at intermediate nodes (agenda by CTU)

A.9.1 CTU apprised that Bhinmal (PG) station is presently connected with Kankroli and Zerda S/s. However, OPGW on Zerda-Ranchhodpura line is under implementation. From this line second path will be commissioned through WR network.

A.9.2 Presently, Bhinmal & Kankroli substations are not connected on redundant communication paths.

A.9.3 As Bhinmal is also connected with RVPNL power network and OPGW is available on the following RVPNL lines:

(i) Bhinmal (PG) – Barmer
(ii) Barmer - Jaisalmer -II
(iii) Jaisalmer -II – Jodhpur (Kankani)
(iv) Jodhpur (Kankani) – Jodhpur (Surpura)

A.9.4 For establishing the redundant communication path, 03 pairs of optical fiber from existing OPGW on RVPNL network are to be shared on (a), (b) & (c).

(a) Bhinmal (PG) –> Barmer-> Jaisalmer-II->Jodhpur (Kankani)->Jodhpur (Surpura) –> Merta->Ratangarh->Sikar

(b) Merta-Beawar- Bhilwara

(c) Merta – Heerapura

A.9.5 During the 2nd ISTS Communication Planning meeting for Northern Region held on 25 July 2022, it was proposed by CTU to install additional STM-16 FOTE at below mentioned substations. It will also create additional ring protection for NR and WR.

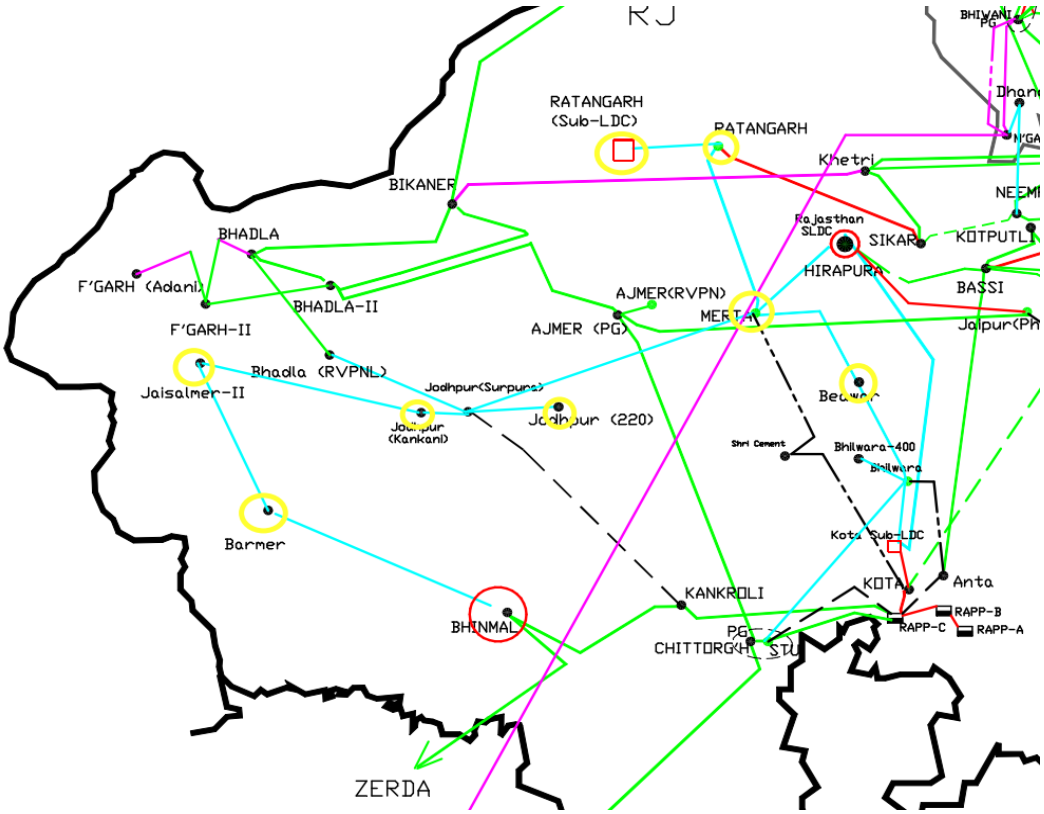
(i) Barmer
(ii) Jaisalmer-II
(iii) Jodhpur (Kankani)
(iv) Jodhpur 220
(v) Merta
(vi) Ratangarh
(vii) Ratangarh Sub-LDC
(viii) Beawar

A.9.6 It may also be mentioned that OPGW is proposed on the 400kV Kankroli – Jodhpur (Surpura) S/c line alongwith reconductoring work on this line. Agenda for the same has already been sent to NCT after seeking views of NRPC by CTU.

A.9.7 This will create additional ring protection to important ISTS stations as well as redundant communication path for Kankroli substation and one more protection path to WR network. Additional FOTE mentioned as above shall also be required to create these ring protection and redundant paths through 400kV Kankroli – Jodhpur (Surpura) link.

A.9.8 RVPNL proposed requirement of OPGW on Jodhpur (Surpura) – Bhadla section (approx. 05 km up to LILO point in Jodhpur (Surpura) – Merta line) for optical connectivity with another node at Bhadla. Further FOTE requirement at Jodhpur (220) & Ratangarh (SLDC) of RVPNL nodes were requested by RVPNL to be included in the above scheme. Same was deliberated and agreed during the meeting. Cost for 5km of OPGW requirement and above mentioned additional 8 nos. STM-16 Communication Equipment and amplifiers are estimated around ₹ 2.55 Crore.

A.9.9 Above scheme for Redundant communication system for Bhinmal (POWERGRID) & Kankroli (POWERGRID) S/s was deliberated in 20th NR-TeST meeting and was recommended for NRPC approval.



A.9.10 After deliberation, forum approved the proposal.

A.10 NR-ISTS RE complex evacuation issues (agenda by NRLDC)

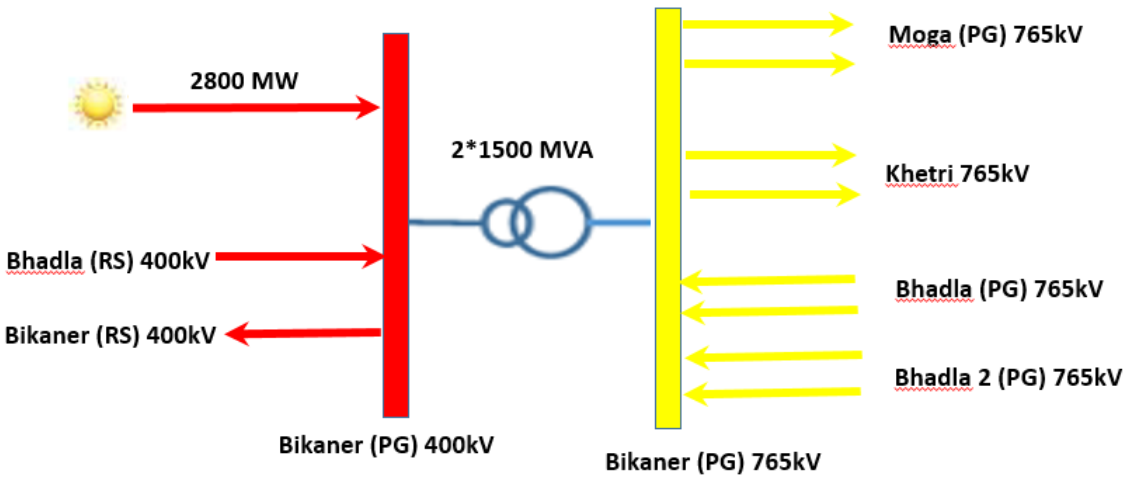
A.10.1 NRLDC representative stated that following capacity of ISTS-RE generation has been connected in Western Rajasthan in Northern region as on 28 September 2022.

User Name	Capacity Approved under LTA/MTOA/STOA (MW)			Total Contracted capacity (MW)	Total Installed Capacity (MW)
	LTA	MTOA	STOA		
Bhadla(PG)	2637	0	450	3087	3087
Bikaner(PG)	1950	240	600	2790	2790
Fatehgarh-II(PG)	2490	0	0	2490	2670
Fatehgarh-I(Adani Pooling)	296	0	690	986	1307
Bhadla-II(PG)	250	0	1003	1253	1253
Total RE at NR ISTS	**7623**	**240**	**2742**	**10605**	**11106***

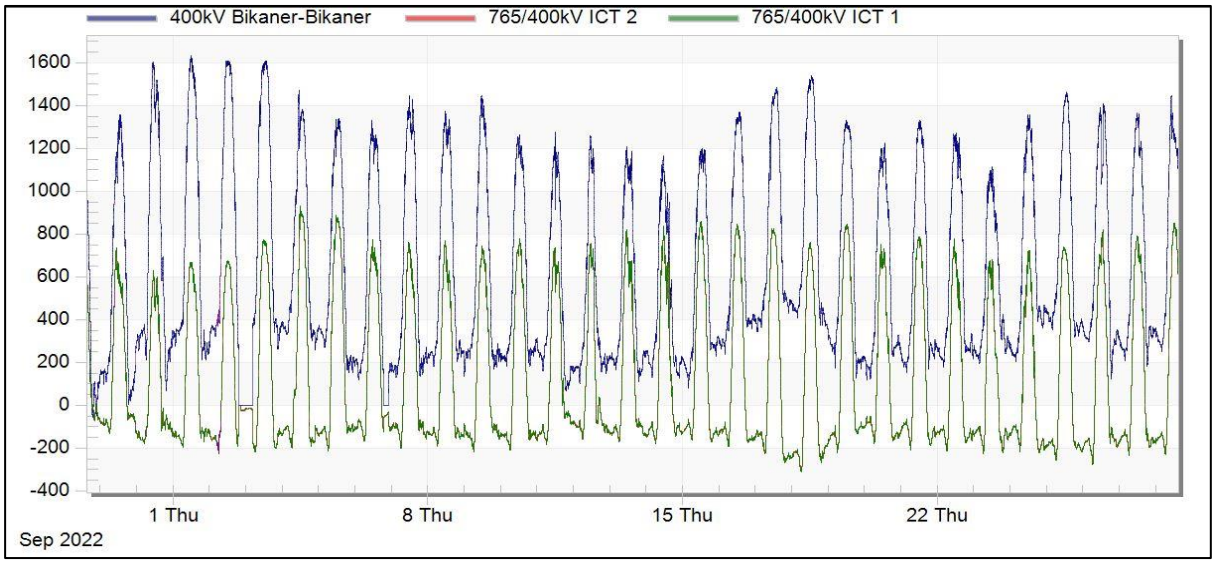
*difference due to hybrid plant installed capacity.

Out of this 10,605 MW around 2742 MW (25%) is being evacuated through short term open access as the planned transmission system for evacuation of RE from these stations is yet to be commissioned. Due to absence of complete planned transmission system, high loading of 400kV Bikaner (PG)-Bikaner (RS) line and voltage issues are being observed in real-time grid operation.

765/400/220kV Bikaner (PG) is connected by following network:



Real-time flows for 765/400kV Bikaner (PG) ICTs and 400kV Bikaner (PG)-Bikaner (RS) line for September 2022 were presented in the meeting and are shown below:



As can be seen from the plots above that the combined loading of 765/400kV Bikaner(PG) ICTs and 400kV Bikaner(PG)-Bikaner(RS) line is crossing 3000MW during high solar generation hours.

Although 400kV Bikaner(PG)-Bikaner(RJ) is quad moose line, the terminal equipment ratings at 400kV Bikaner(RJ) end is much lower as reported by Rajasthan SLDC, therefore it would be difficult to overload the line even for short duration and thus, endangers threat to entire solar generation complex as it may lead to cascade tripping.

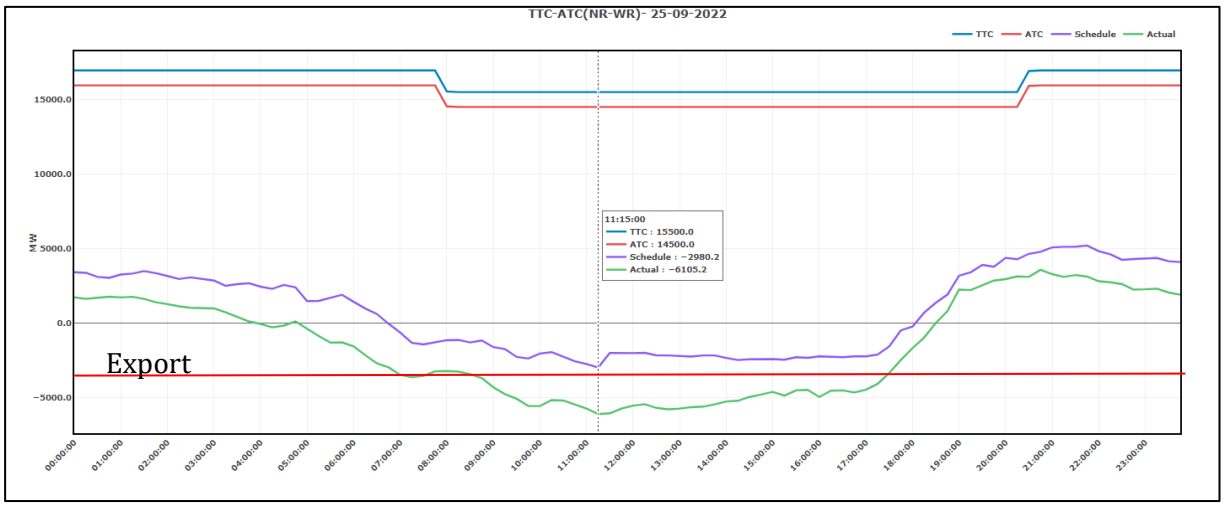
With the onset of winter, it is expected that the loading of 765kV Bikaner-Moga D/C and 765kV Bikaner-Khetri D/C may further reduce due to reduced demand of NR states such as Punjab, Haryana and Delhi, whereas loading of 400kV Bikaner(PG)-Bikaner(RS) may further increase due to higher demand of Rajasthan control area during winter months.

As deliberated in 198th OCC meeting and 57th NRPC meeting held in August 2022, to control loading of 400kV Bikaner(PG)-Bikaner(RS), 400kV Bikaner(RS)-Sikar D/C lines are being kept open during high solar generation hours. Even after the opening of these lines, loading of 400kV Bikaner(PG)-Bikaner(RS) is remaining high as shown above.

Power flow from 400kV Bhadla(RJ) to 765/400kV Bikaner(PG) generally remains in range of 0-200MW. Moreover, 400kV lines from Bhadla(RJ) to Jodhpur and Merta also remain highly loaded during peak solar generation hours. Therefore, there does not seem to be any further margin in enhancing power evacuation from the complex with the present network.

As per simulation studies, the sensitivity of tripping of one 765/400 kV Bikaner (PG) ICT (meaning N-1) on 400kV Bikaner (PG)-Bikaner (RJ) is 30% while that of 400 kV Bhadla (RJ)-Bikaner (RJ) is 50%. Both the contingencies would increase loading of 400kV Bikaner (PG)-Bikaner (RJ) by 200-250MW (if loaded beyond certain limit), therefore loading of 400kV Bikaner (PG)-Bikaner (RJ) line will be beyond 1700MW (beyond short term overload capacity). Further, on tripping of 400kV Bikaner (PG)-Bikaner (RJ) line, the 765/400 kV ICTs would be loaded to 94% of their capacity (thus further N-1 non-compliant).

Moreover, it is also being observed that with the onset of winter and reduced demand in Northern region during high solar generation in Northern region, NR-WR export ATC is being violated. Against existing ATC/TTC limits of 3100/3600MW, it can be seen that NR export is sometimes exceeding the ATC/TTC limits during high solar generation hours.



A.10.2 CGM(I/C), NRLDC stated that 400kV Bikaner (PG)-Bikaner (RJ) is quad moose line, however the terminal equipment ratings at 400kV Bikaner (RJ) end is 2kA and therefore the line can safely carry 1.732*400*2 = 1385MVA power. From these patterns, it is seen that the loading of 400kV Bikaner (PG)-Bikaner (RJ) line during high solar generation hours is nearly 1400MW (meaning fully loaded) and that on 765/400 kV Bikaner (PG) ICTS (2*1500 MVA) is of the order of 800-850 MW each. Further, on tripping of 400kV Bikaner (PG)-Bikaner (RJ) line, the 765/400 kV ICTs would be loaded to 94% of their capacity (thus further N-1 non-compliant). There is serious evacuation issue from Bikaner(PG) while the generation at other stations such as Bhadla2(PG) and Fatehgarh-2(PG) have slightly lower sensitivity.

A.10.3 The importance of lines planned for phase-2 generation evacuation such as 765kV Fatehgarh2-Bhadla2 (2nd D/C), 765kV Bhadla2-Sikar2 2X D/C and commissioning of 400kV Bikaner-II including removal of LILO of 400kV Bhadla(RJ)-Bikaner(RJ) at 400kV Bikaner(PG) were deliberated and it was requested that all these transmission lines along with other transmission elements such as respective line reactors, bus reactors and ICTs may be commissioned at the earliest as Phase-2 generation (nearly 1.5GW) has been coming up while none of the transmission system is commissioned.

A.10.4 Apart from above, during high wind generation at intra-state (Rajasthan) RE plants, there has been observance of oscillations in system and therefore requirement of curtailment of RE power in the past. Same also need to be investigated at RVPN end.

A.10.5 MS, NRPC expressed concern that Phase-2 transmission system is delayed whereas solar generators are coming up rapidly and there does not seem to be any further margin for solar generation evacuation. He also asked CTUIL to

present status of REZ transmission schemes in every NRPC meeting so that NRPC forum is aware of the present status of commissioning of RE transmission schemes and if any transmission scheme needs to be expedited, same may be discussed at NRPC level. The status would be included as a standing agenda from next NRPC meeting.

A.10.6 CTUIL representative stated that all transmission elements part of GIB area have been cleared by the committee recently, however, there has been delay in approval and transmission licensees also need to be provided with 15 months for commissioning of transmission elements. Bikaner-II S/s is lined up for December 2022 along with associated transmission elements whereas other transmission elements are not expected before August 2023. Solar generators are being advised to match their commissioning along with transmission system however, same is not being seen in actual and around 1.5GW of RE generation planned along with phase-II transmission system has been commissioned.

A.10.7 NRPC forum agreed that transmission elements which are part of Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under phase-II including 400kV Bikaner-II and STATCOMs at Bhadla-II and Fatehgarh-II are urgently required and need to be expedited.

It was also discussed and agreed that the existing transmission system has reached the limits for evacuation of RE generation and considering that many large RE generation loss tripping events were observed in the past, forum was of the opinion that, any further evacuation would make the RE generation complex vulnerable. Therefore, NRLDC may keep close watch at loading of evacuation system and take action for smooth grid operation. .

A.10.8 Apart from above, commissioning of following approved transmission system may be expedited for enhancing NR-WR exchange limits:

1. Bypassing of 400 kV Kankroli - Bhinmal-Zerda line at Bhinmal to form 400 kV Kankroli – Zerda (direct) line #

2. Reconductoring of 400 kV Jodhpur (Surpura)(RVPN) – Kankroli S/c (twin moose) line with twin HTLS conductor*-188 km

#with necessary arrangement for bypassing Kankroli- Zerda line at Bhinmal with suitable switching equipment inside the Bhinmal substation.

* with minimum capacity of 1940 MVA/ckt at nominal voltage; Upgradation of existing 400kV bay equipments each at Jodhpur (Surpura)(RVPN) and Kankroli S/s (3150 A).

A.11 Winter preparedness in Northern region (agenda by NRLDC)

A.11.1 In the meeting, it was deliberated that winter in Northern region is likely to start from mid of October till February end, and the challenges faced during these months are well known to all the utilities. During winter, demand of NR states except Rajasthan and hilly states starts reducing. With decreasing temperatures and festivals, winter also brings some severe challenges to NR grid operators:

(i) Load-generation balance including matching ramp in demand which is increasing with increased solar generation
(ii) High voltages in grid
(iii) EHV line trip during fog/Smog
(iv) Load crash due to inclement weather
(v) Frequent tripping of ICTs on overflux and lines on overvoltage

A.11.2 Accordingly, utilities were requested to follow following measures for safe and secure operation of grid during winter months:

- Forecast of demand ramp is important and so SLDCs were advised to forecast demand and ramp rate of demand especially for morning and evening peaks so that commensurate ramping of generation can also be planned.
- ISGS hydro stations are being scheduled by NRLDC to provide maximum support and requisite ramp rate during peak hours, keeping in view their forecasted daily energy availability as well as mechanical availability. SLDCs were also requested to optimally schedule their hydro and gas generation to make sure that demand as well as ramp requirements are met.
- Minimize generation to technical minimum as per IEGC guidelines /CERC directions during low demand.
- Optimum utilization of Hydro resources for meeting peak hour demand.
- Ensure additional trained manpower is available especially during night hours at all major control centers/ substations
- All system operators and transmission utilities shall regularly monitor weather forecast site (Weather portal for power sector)
- All the protection settings are as approved by NRPC so as to avoid any false tripping on overvoltage or overflux protection.
- Priority wise cleaning & replacement of damaged insulators.
- Monitor progress of cleaning and replacement of porcelain insulator with polymer insulator and furnishing updated status to NRPC/NRLDC.

A.11.3 Apart from above following measures need to be taken to manage high voltages in the grid during winter months:

- Ensuring disconnection of capacitors & switch on of reactors.
- Ensuring healthiness of all commissioned reactors in the system
- Monitoring of reactive power of generators and exchange of reactive power with ISTS through SCADA displays.
- Ensuring reactive power support (absorption) from generating stations by operating units upto their capability limits.
- Synchronous condenser operation especially of hydro units during night hours for dynamic voltage support. Some of the generators have already been tested successfully (Tehri, Chamera, Pong etc.) in synchronous condenser mode and shall be available for condenser mode of operation as and when required. As discussed in OCC, RSD is expected to be used as synchronous condenser from this winter.
- ICT Tap Optimization at 400kV & above is carried out every year by NRLDC. Same exercise needs to be carried out by SLDCs at 220kV & below levels.

- Opening of EHV lines based on expected voltage reduction and also considering security & reliability of system. This exercise to be done at 400kV and above voltage level by NRLDC and 220kV and below voltage level by SLDCs, but only as the last resort after utilizing all other resources.
- To ensure that line reactors are available even after opening of lines are optimally utilized it is necessary that updated details of all the stations where the provision of using line reactors as bus reactors exist, is available at all control centers. The Reactive power document being compiled by NRLDC has the details of all such line reactors. Last updated document is available at NRLDC website under documents section: *https://nrldc.in/download/nr-reactive-power-management-2022/?wpdmdl=9908*
- All utilities were requested to go through the document and report if any incorrect or missing information is noticed. The document is being utilized in real-time operation by control room operators at NRLDC, and thus it is necessary that list of all reactors where such provision is available are updated in the document.

A.11.4 Members agreed to take actions as discussed to ensure safe and secure operation of grid during winter months.

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